

HIBISCADELPHUS NUMBER KK-HX-1
AN INTERNATIONAL TREASURE IN HAWAII

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Until higher education larned us more better, we considered mal-
low flowers to be flat and open; lobelia flowers to be tubular and
curved; and bird beaks, except those of hawks and owls, to be
straight and pecky.

The genus Hibiscadelphus (Malvaceae), established by Rock in
1911, is a remarkable group of endemic species restricted to limit-
ed areas of the Hawaiian Islands. How many existed in the drier
forests before man's coming thousands of years ago is guesswork.
The normally increasing population from the original introduction
probably, like the "brother" genus Hibiscus, "walked" more or less
"dryshod" through the ancient archipelago as islands repeatedly
rose from the depths, melted together with lava flows andor fall-
ing sea level, separated with erosion andor rising sea level, and
drifted slowly westward on the Earth's crust. Today botanists re-
cognize a species from Kauai, represented by about half a dozen
trees in Waimea Canyon; one from East Maui, now extinct; one from
northern Hawaii, now extinct; and two others from Hawaii. These
last are H. hualalaiensis Rock (plate 1), now centering in greatly
reduced numbers in a remnant forest about Puu Waawaa; and H. gif-
fardianus Rock (plate 2), consisting so far as we know of a vener-
able tree officially labeled KK-HX-1, with its numerous semidomes-
ticated offspring growing in Hawaii Volcanoes National Park in Ki-
puka Ki and Puulu, and in a few State parks and gardens.

For readers unacquainted with the Islands, we wish to explain
that the vernacular word "kipuka," certainly worth anglicising,
refers to "the hole" according to the Hawaiians, formed by newer
lava flows surrounding older ones. It is truly an oasis of richer
terrain, such as are common on Maui and Hawaii where volcanoes
are quiescent or active. These kipukas are famed for often har-
boring the Islands' rarest plants and the endemic animals depend-
ing on them for food and shelter.

The avian fauna of the Hawaiian Archipelago is famous for the
endemic, nectar feeding "honeycreepers" IsicI, belonging to the
Drepanididae (the proper orthographic ending for a Family in Zoo-
logy). Amadon in 1950 recognized nine genera consisting of 22
species and 24 subspecies. The State of Hawaii is truly infamous
that about 40% of these remarkable taxa have been encouraged to
become extinct. Modern ornithologists do not agree whether their
ancient origin was Central American, Malaysian, or perhaps both
disjunct regions. Being botanists and hence not prejudiced by or-
nithology, our snap judgment favors Malaysia as so many of Hawai'
i's plant genera which produce indigestible seeds enclosed in
fruits palatable to birds have their closest relatives there. We

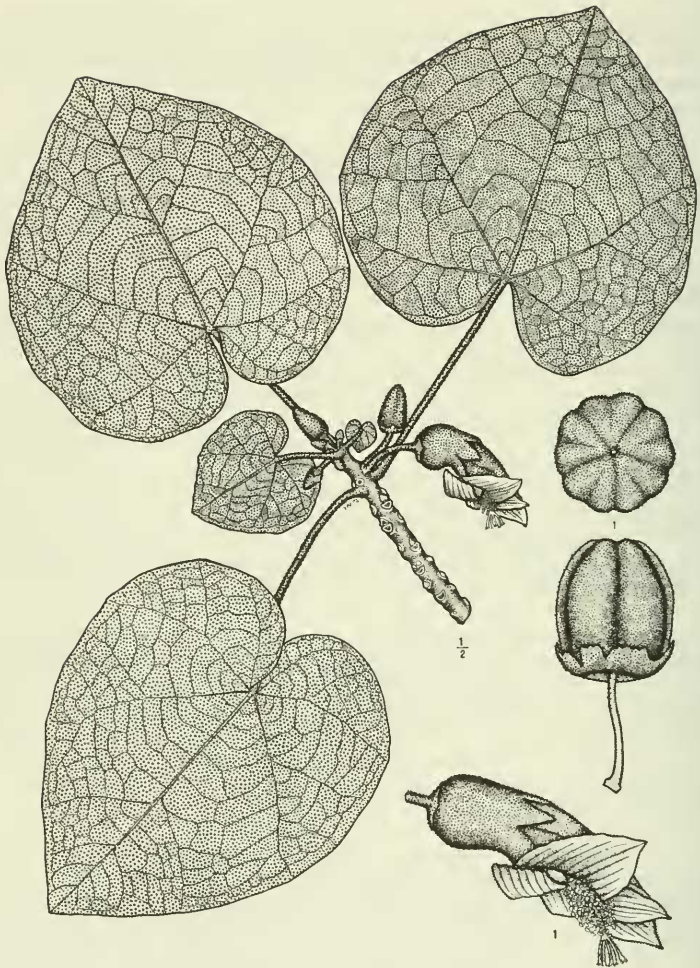


Plate 1. Hibiscadelphus hualalaiensis J.F. Rock
(After Degener)

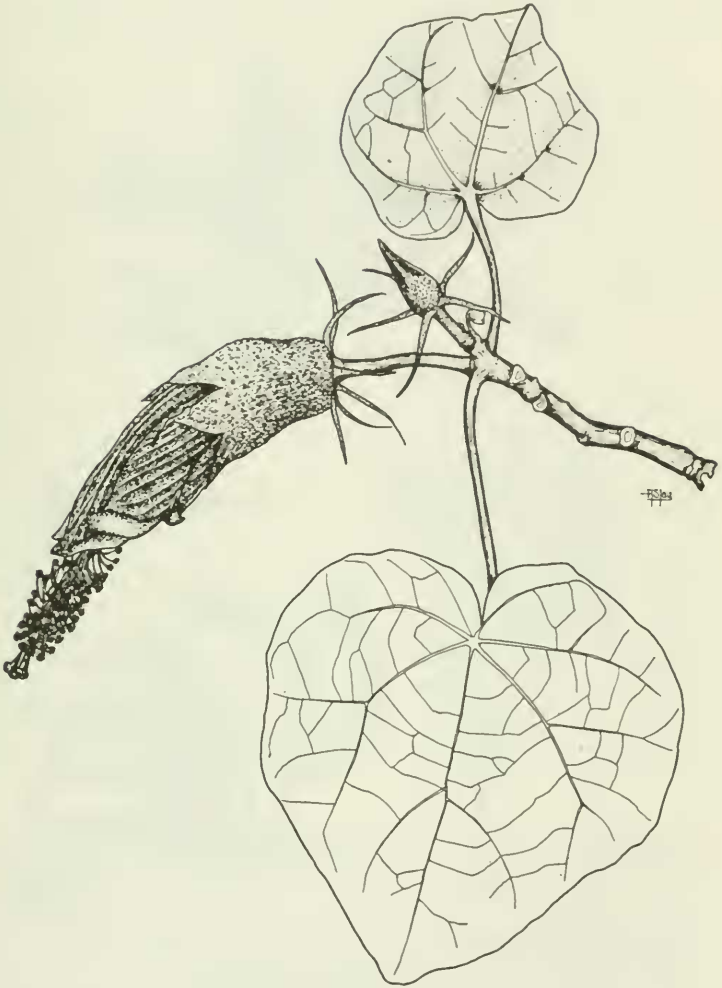


Plate 2. Hibiscadelphus giffardianus J.F. Rock
Twig of type tree, 1929. (After Degener)

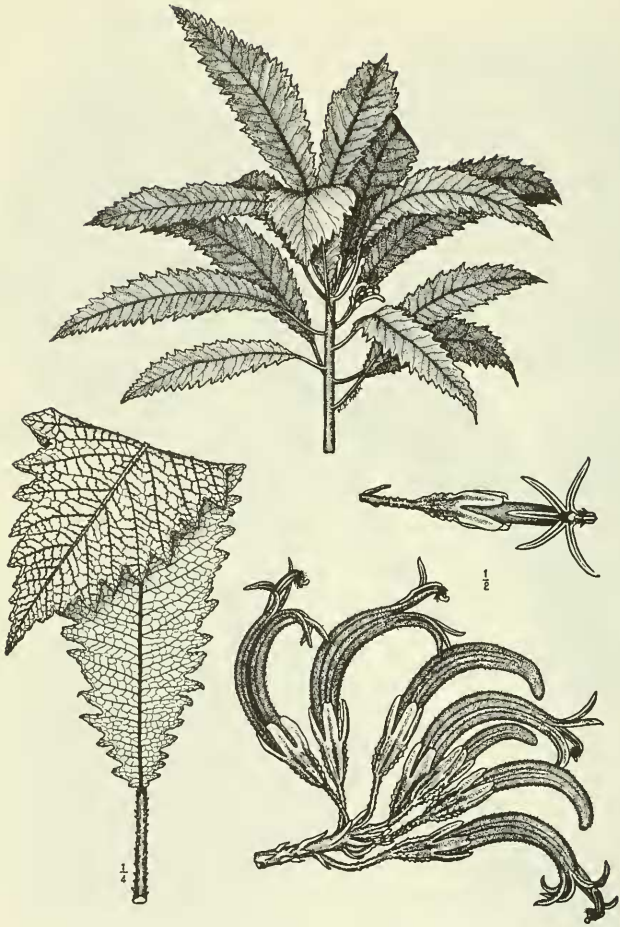


Plate 3. *Cyanea baldwinii* Forbes & Munro
(After Degener)

believe that if frugivorous birds were able, undoubtedly aided by numerous stepping-stone islands existing between the two land masses, to settle in the Hawaiian Islands, that the ancestors of the Drepanididae did also. Their nectar based droppings left us no visible legacy as evidence.

Drepanididae over millions of years intermeshed in an evolutionary way in development with Lobeliaceae, of which all but two small genera of the native nine, bear curved, tubular flowers. The lobelioids (the genus Lobelia is not native to the Islands), from sea level to all but the highest mountains on the Islands of Hawaii and Maui, in taxa and sheer numbers of individuals must have been enormous before man's unwitting extermination of the endemic biota began a few thousand years ago! Since 1778 when Captain Cook rediscovered the Islands, Gaudichaud, Hillebrand, Rock, Wimmer and a few others were able to describe about 275 surviving taxa scattered among Clermontia, Cyanea (plate 3), Delissea, Galeatella, Neowimmeria, Rollandia and Trematolobelia.

Into this environment crowded with curved, tubular Lobeliaceae flowers which the curious, slightly rubbery beaks of the drepanids entered like a hand into a glove, some mallow with spreading, actinomorphic flower similar to that of the hibiscus, arrived. This immigration was probably by floating seed or sealed capsule driven by some unusual southwesterly gale. With a curved corolla excreting nectar and secreting minute insects, and an efficient shape for pollination by birds with a bill similarly curved (plate 4); this ancient hibiscoid finally had evolved the peculiar corolla shape for which the genus Hibiscadelphus is famous. This may very well have taken eons; perhaps while such island as Midway arose from the deep where Hawaii now exists, grew to a considerable height and, as volcanism there died as it slowly floated westward, gradually eroded away to become the "low" atoll we know today. Believing in these developments in the fields of Botany, Zoology and Geology, both of us kane and wahine dreamers consider the genus a Sacred Creation of Nature, a true International Treasure.

While working on his Master's thesis about the gametophyte of Lycopodium cernuum in Kilauea's fumaroles in 1922 under the direction of Dr. James B. Pollock, Exchange Professor from the University of Michigan at the University of Hawaii, the kane writer first saw Rock's type plant of Hibiscadelphus giffardianus. It was growing beyond the boundary at 3,900 feet elevation of Hawaii National Park in Kipuka Puauulu, then considered part of Brown's Ranch. This last surviving tree was perched on the outer, southeastern rim of a collapsed lava tube in such a position that cattle were reluctant to risk browsing on it.

Become Naturalist of the Park in 1929, the kane frequently walked, motored and rode horseback to the tree, then ailing because of injury to its trunk, to gather fallen flowers and dried leaves. With a little soaking, he was able to furnish leading botanical institutions in America and elsewhere with authentic



Plate 4. The mambo, a nectar feeder.
(After Wilson & Evans)

specimens. He likewise broke off one twig so that his student artist, the late Hung Sun Lau, could draw it for the projected "Plants Hawaii National Park," published in 1930. There, plate 59, please note, is an illustration of part of the actual type tree. A popular description accompanies it; while a scientific one appears in *Flora Haw.*, 9/10/32.

Though the type tree or at least its aerial part appeared to have died in 1930, the kane was delighted that two trees were growing on each side of the road leading into Walter M. Giffard's vacation home at Kilauea and Kalanikoa Streets, Volcano. Leaving the Island of Hawaii to botanize mainly on the other islands, thoughts of Hibiscadelphus waned until the Degeners purchased a home in 1966 catercornered from the one formerly owned by Giffard. Inspection of the premises showed the trees gone. Their sadness concerning the apparent extinction of this rare species turned to joy when Geologist Howard Powers, who had been employed at the Park at the same time as the kane in 1929, not only led them to a magnificent tree of the species forty feet tall and with a six and a half inch trunk along the Mauna Loa Strip Road in Kipuka Ki of the renamed

Hawaii Volcanoes National Park; but gave them a potted plant he had raised from a seedling to set out in their new garden. With this gift, in addition to gifts through Ranger Donald Reeser, and roadside seedlings growing near the tree as well as plants raised by them from seed, their garden may become a refuge for about a score of plants should a lava flow from Mauna Loa ever destroy the kipuka.

Complicating matters, specimens of H. hualalaiensis Rock, known from the Puu Waawaa area of the mountain Hualalai and not from the National Park, had been planted near Kipuka Ki in the 1950s or early '60s and at length began to flower. Purists, perhaps rightly so were the species common, maintain such trees should be destroyed as alien to the Park. We Degeners reason that so long as *exot-

*Gold and silver Pityrogramma ferns among dry lava and cinders particularly about the summit area of Kilauea; grasses, presumably introduced during World War II as grain in straw for Army mules and now posing a fire hazard in all but wet jungles - difficult to control biologically because of the potential danger of the parasite transferring to sugarcane; Bulbostylis capillaris in stramineous tufts in cinders about the Kau Desert; Hedychium coronarium, H. flavescens and H. gardnerianum spreading rapidly from Park and concessioner buildings to smother endemic herbs; Arundo bambusifolia in grassy and dry areas; Myrica faya, purposely introduced by foresters, remaining in small numbers in 1977 after heroic eradication work in forests and burned areas; Polygonum chinense along roadsides a distinct danger with its red leaves and pink flowers when it spreads into the Kau Desert to brighten the black lava unnaturally; Anemone hupehensis replacing silvery Astelia colonies as soon as these are destroyed by feral pigs; the white-fruited strawberry Fragaria chiloensis var. ananassa, abundant about Kipuka Puaulu and Kipuka Ki, usually misidentified for the endemic red-fruited F. c. var. sandwicensis; Rubus penetrans, R. rosifolius and the truly vicious R. ellipticus, being partially controlled biologically with some resulting injury to the endemic species; Abrus precatorius with its deadly bean about Wahaula; Fuchsia magellanica, beautifully festooning trees where the endemic Stenogyne calaminthoides used to thrive, about Thurston Lava Tube, and creating thickets strangling endemics; Nasturtium majus s. l., in Kipuka Puaulu; Rai-mannia along roads especially about Kilauea Crater and the Mauna Loa Strip; Eucalyptus where the endemic koa should tower; Heterocentron subtripplinervium near Kilauea-Iki; Linociera introduced into the old Ainahou Ranch area by the late Herbert Shipman who saved the endemic goose from extinction; Buddleja asiatica s. l., a pioneer on lava flows and persistent elsewhere so numerous that it requires biological control in spite of potential injury to some cultigens of the genus; Conyza along roads and drier localities requiring biological control as does its relative Pluchea odorata of somewhat more favorable areas; as well as others. Such weeds need eradication before time, effort and funds are expended in trying to justify the eradication of questionable taxa of the endemic genus Hibiscadelphus. The present administration, well aware of priorities, is engaging the services beginning March 1977 of the Plant Ecologist and Pathologist Dr. Donald Gardner. Had plants developed a nervous system, these noxious weeds would be trembling at their seats.

ics are overrunning the National Park and feral pigs are causing havoc because of insufficient personnel, H. hualalaiensis should be the lowest taxon on the totem pole to be removed from National Park lands. The gene pool should be preserved for later and probably wiser generations. What the decision will be, no one now knows.

The stately H. giffardianus in Kipuka Ki flowers and fruits profusely, the abundant seed, we noted one early morning being avidly gathered by a feral pheasant. The seeds germinate readily under the tree in the leaf mold along and actually on the road. This one plant from which the Degener trees and the nursery stock grown at the Park originated, bears the metal tag No. KK-HX-1. In spite of our widely expressed conviction to colleagues and others regarding the tree in question being H. giffardianus, some individuals consider it a hybrid between this species and H. hualalaiensis. Believing it a hybrid, they proposed it be felled as not worthy of existence in the Park. A lecture about the problem presented at the Hawaii Field Research Center at the Park in August 1976 did not change our views. Not only that; but letters, we have learned, have been sent to World Arboreta and Herbaria stating that the Degener identifications are faulty and their distributed specimens, being hybrids, should be destroyed.

Worried about the future of this remarkable genus, we casually wrote Dr. Powers, now retired and residing on Oahu, about the possible fate of the tree we so admired. Not realizing that he had remained at the National Park long after the kane's departure, we were dumbfounded by his answering letter postmarked December 6, 1976. It reads, in part:

"The seedling I gave you of the Hibiscadelphus Giffardianus was dug up from under the tree that Don Reeser is talking about. - - - I recently heard first hand from Jim Tobin, retired Park Service, that he had been a buck ranger assigned to Hawaii National Park in his early days 1942 onward. The tree that you describe on page 211 - - - was still alive in Herbert Shipman's pasture just over the fence from the Park land. Young Jim had apparently learned about the fact that the tree was the only representative in the world, so he and a sympathetic companion would make forays across the fence to collect seeds (and I think he said take cuttings also) and propagated the Giffardianus. The two trees in Kipuka Ki are from Tobin's activities. They must be pure. There is also a planting of two or three H. Hualalaiensis in Kipuka Ki, below the road makai [oceanward] of the two H. Giffardianus - more than a hundred meters down slope as I remember - - -. They certainly weren't there when the pedigree of the H. Giffardianus specimens in Ki was determined." Dr. Powers then questions how fertilization in the genus takes place: "- - - what kind of bird or insect or wind power would move pollen from the H. Hualalai up to the H. Giffardianus? I don't know, so I can't say whether your H. Giffardianus is a hybrid or a 'pure' specimen." We Degeners likewise do not know if this maturing seedling is pure until it flowers, as we do not know the parentage of the pollen.

According to retired Forester Lester W. Bryan's records of April



Plate 5. J.F. Rock planting H. giffardianus.
(L.W. Bryan photo Sept. 1, 1940.)

1946 "The tree found by Rock in 1911 was then in poor condition, and within a few years, it finally succumbed. - - - Sometime after the discovery of the original tree, Mr. Giffard collected seeds and grew them at his mountain home near the Volcano Road at 29 Miles - - -. From this tree, cuttings were taken; one of which rooted and grew. After it became well established, it was taken up and in September 1940, transplanted inside a fenced area in the Shipman 'Keauhou Ranch.' where it is still growing today.

"Of interest is the fact that in September of 1940 when this tree was ready for transplanting, Prof. Joseph F. Rock, who originally discovered and named this tree was visiting here in Hawaii and had the pleasure of preparing the hole and transplanting the descendant of the parent tree which he had discovered nearly 30 years before." (Plate 5.)

Retired Entomologist Cliften J. Davis, a Park Ranger in his youth, independently gave us essentially the same general information as did Powers and Bryan; in addition to explaining how he and others about 1940 propagated the species by seed and cuttings. These were planted out in various places in the Islands and on the Mainland. How many of these trees or their offspring survive today, we do not know.

Because of the statute of limitations regarding the fortunate act by two "buck rangers" of trespassing about twenty five years ago to air layer a remarkable species on the verge of extinction, we here add a few paragraphs from a letter dated February 11, 1977:

"Dear Dr. Degener:

Your letter of February 2 is most welcome. - - - As to my recollections of the *Hibiscadelphus giffardianus*, they are very clear as to how but not as to when we made the air layerings. The operation was carried out by Vernon R. 'Ross' Bender and myself sometime during the 1951-52 era. We slipped over to Keauhou Ranch under cover of darkness, made slanted cuts about two-thirds through a stem, inserted a toothpick or similarly sized sliver of wood in the cut and then wrapped the whole thing in a plastic bandage that contained wetted sphagnum moss. Ever so often thereafter we would return, check the 'bandage' for moisture, wet it a little if needed, and check for roots. When the layering showed roots of an inch or so we cut the rooted stem free, took it to the National Park Service greenhouse, potted it, and gave it regular care. There were several such cuttings (2 to 3 to perhaps 6) taken in a span of about one year. I am not certain they all lived.

"Ross Bender is now retired and lives at 43390 Alta Acres Drive, Three Rivers, California 93271. He may have notes from that time as he supervised the nursery and kept some records on the various plants we were trying to propagate.

"Later, perhaps during 1952-53, Elroy Bohlin took over the nursery project and I think he too worked with *Hibiscadelphus giffardianus*. By then relations between the NPS and ranch management had improved and surreptitious snitching of cuttings became unneces-



Hibiscadelphus giffardianus, Shipman Keauhou Ranch, June 1960.
(L.W. Bryan photo)

sary. Bohlin lives at 7822 N.E. Point No Point Road, Hansville, Washington 98340.

"I certainly hope these clues are helpful. At the time Ross and I made the cuttings I understood the Keahou specimen was the last known. Incidentally I remember setting out rooted cuttings in Kipuka Puaulu and on the Mauna Loa Strip road. These were enclosed with hog wire and I regularly carried water to them in 5 gallon back pump tanks during dry spells.

[Signed] Daniel J. Tobin, Jr.
Superintendent
[Mount Rainier National Park] "

We are convinced tree No. KK-HX-1 originated from a self-fertilized seed of the type tree. The tree certainly resembles the type plant as the kane remembers it in Kipuka Puaulu; its flowering twigs resemble it in Kipuka Puaulu; its flowering twigs match Plate 58; and all seedlings, none of which have yet flowered as it takes the tree years to mature, are uniform in the vegetative state and resemble the species. None, as expected in a hybrid, show a dual ancestry. Furthermore, this venerable tree was growing in Kipuka K1 over a decade before the introduction of H. hualalaiensis to the Park from the latter's home at Puu Waawaa about fifty miles distant as the crow flies. It would be fantastic had it arisen by cross-fertilization from pollen coming from such a distance.

In summary, whether hybrids exist in the Park, whether some will be developed by artificial pollination or whether the two species of Hibiscadelphus are a bit confusing because of the occurrence of aneuploid forms (as in Santalum paniculatum H. & A., and S. pilgeri Rock

likewise growing about Kipuka Puaulu and Puu Waawaa respectively), we consider this old tree to be pure H. giffardianus.

The chronology of events begins with Rock's discovery of the type tree of Hibiscadelphus giffardianus in 1911 in Kipuka Puaulu. As no other tree of the species existed in the World nor even a plant of H. hualalaiensis Rock grew nearer than about fifty miles, seeds produced must have been the result of self-pollination and hence self-fertilization. A tree grown from such seed, and hence F_1 generation, was planted in Giffard's garden. A cutting from the resulting tree, and thus still F_1 , was planted by Rock at Keauhou Ranch. Two rangers, making air layers of it, planted one of these along the Mauna Loa Strip Road in Kipuka Ki. This resulting tree, now forty feet tall, is F_1 or, more simply stated, a seedling and direct descendant of the type tree.

The binomial "HIBISCADELPHUS X PUAKUAHIWI K. Baker and S. Allen, Hybrid novum," in *Phytologia* 33(4):276. 1976 and represented by tree No. KK-HX-1 must be rejected. The name is a synonym of Hibiscadelphus giffardianus Rock in *Haw. Bd. Agric. & Forestry Bull.* 1:10, pl. 4. 1911.

We are convinced the forty foot tree marked Number KK-HX-1 must not be felled. Arn't you?